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Measurement of the Structure of Means and Goals in Organizations

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13. ABSTRACT

Initial phases as reported of a project to develop a computerized system of content analysis for protocols of organizational communication with the object of meaning the structure of perceived means and goals. Adaptation and extension of the General Inquirer computer program is contemplated.

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The purpose of this project is the development of a computerized system for the content analysis of protocols of organizational communication with a view to abstracting the organization's goal structure. The goal structure is defined as the perceived means-end connections among the situations or activities undertaken or strived for by the organization, including the assignment of functions to specific organizational components. The project was conceived to consist of three phases: (1) collection and development of operating familiarity with computer programs for the content analysis of natural language that already exist; (2) collection of appropriate protocols from organizations; (3) the development of the system.

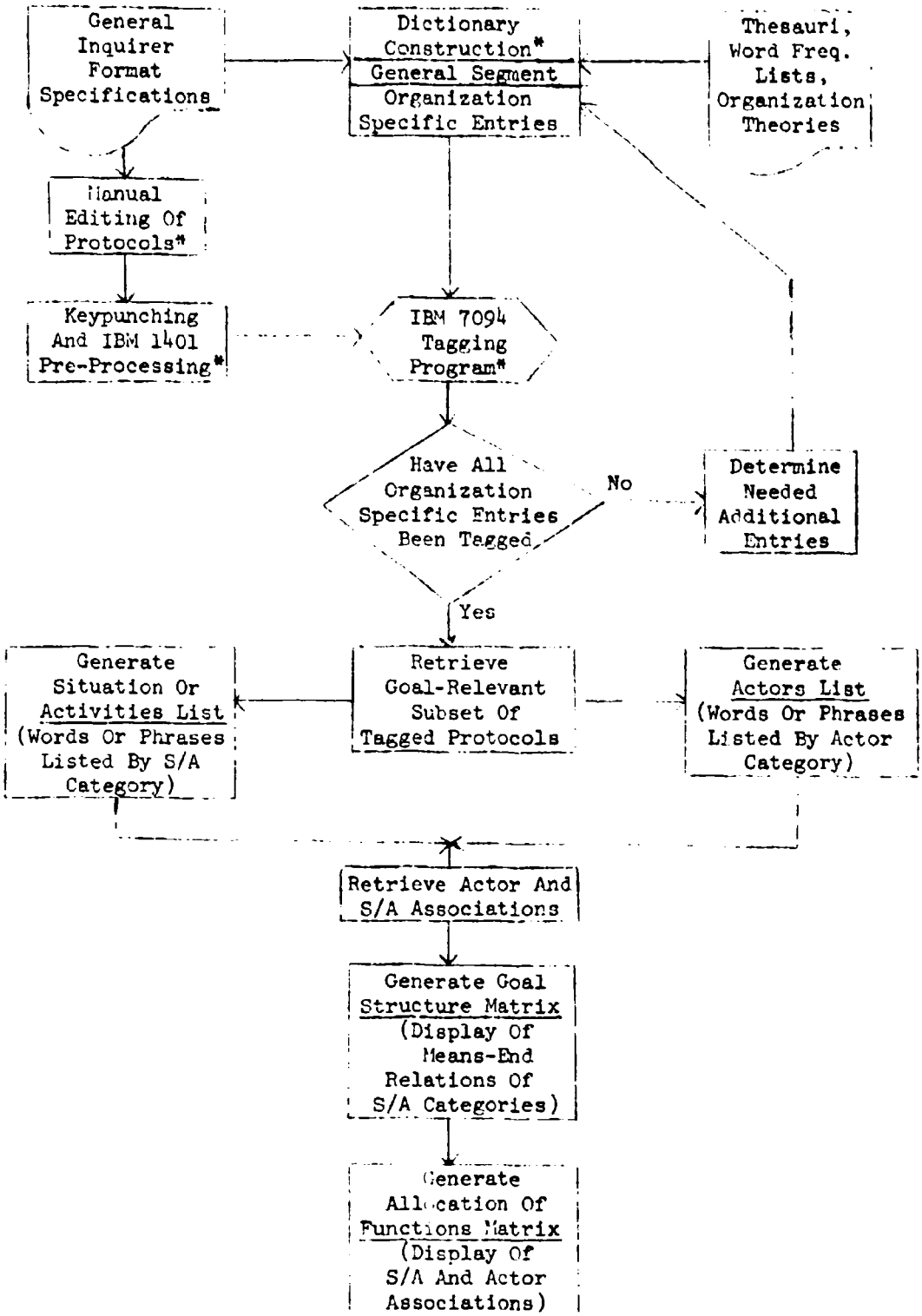
The collection and development of existing programs proved to be much more difficult than originally envisioned. Although a six month lead time was allowed for the procurement of software, this proved a conservative estimate. The resolution of uncertainties concerning available equipment and the tracking down of appropriate programs is still continuing. Although our first computer runs were made in October, 1968, all we were able to do was list source decks for the 1401 General Inquirer programs and for some of the dictionaries already developed. We began pursuing two alternatives for the tagging phases of the General Inquirer: (A) A conveniently available 7094, and (B) an existing program for 1401 with disc. After negotiations with two potential outside contractors we were finally able to conclude a satisfactory agreement for the use of a 7094 with the University of Chicago Computing Center in March, 1969. Since this center maintains the General Inquirer tagging program as part of its standard library, our development problems for this phase of the processing are much reduced. We were able to acquire the tagging routine for 1401 with disc only in February, 1969. It proved to have unforeseen hardware incompatibilities with the UWI system, so we have foreclosed further consideration of this alternative.

Although the 1401 cross-sort program and the dictionary listings gave us the material we needed for dictionary development, further testing of the 1401 tag tally count and retrieval routines could not be achieved without tagging output. Our first successful tagging runs were made on March 28, 1969, and disclosed deficiencies in both of the 1401 programs. A later version of retrieval was obtained, but also has not been operable on our equipment.

Our research will eventually require programs of other kinds. There will need to be some dependence on routines for syntactic analysis and other procedures for establishing the meaning of certain phrases at the semantic level. Much work on the General Inquirer has proceeded in the direction of syntactic analysis. The tagging program we are using at the University of Chicago (due to D. Goldhamer) is a modified version of the original General Inquirer that includes substantially more elaborate facilities for syntax analysis. An even more advanced version of the General Inquirer (Inquirer II, by Arp, Miller, and Psathas) is under development at Washington University, St. Louis. We wish to explore fully the usefulness of these programs before committing ourselves to the acquisition or development of other programs at the syntactic or semantic level.

The development of protocols for analysis has proceeded satisfactorily. We now have in computer compatible format one small but rich protocol (A), which will be used purely for technical exercises, and a larger series of protocols (B) representing annual reports at a technical level of an organization in which we have a continuing research interest. The latter protocols are being developed and analyzed to serve the objective of validating the eventual system.

Steps toward system development include the preparation of a dictionary embodying the theory that underlies the concept of goal structure and the accompanying flow chart that represents our first attempt at specifying the


General Inquirer Format Specifications
Dictionary Construction*
General Segment
Organization Specific Entries
Thesauri, Word Freq. Lists, Organization Theories
Manual Editing Of Protocols*
Keypunching And IBM 1401 Pre-Processing*
IBM 7094 Tagging Program*
Have All Organization Specific Entries Been Tagged
No
Determine Needed Additional Entries
Yes
Generate Situation Or Activities List (Words Or Phrases Listed By S/A Category)
Retrieve Goal-Relevant Subset Of Tagged Protocols
Generate Actors List (Words Or Phrases Listed By Actor Category)
Retrieve Actor And S/A Associations
Generate Goal Structure Matrix (Display Of Means-End Relations Of S/A Categories)
Generate Allocation Of Functions Matrix (Display Of S/A And Actor Associations)

components of the eventual system. Only the components marked with asterisk have been actually run, and they remain at a very primitive stage of development. This much experience has established useable input-output routines and a satisfactory dictionary lookup operation.

We will continue to work with the University of Chicago Computer Center and try to develop the 1401 routines to a level of operationality consistent with the tagging output we receive from Chicago. We also plan, as soon as this would be productive, to test our system on the Inquirer II at Chicago or at Washington University. The possible advantages of this software would be that it is written in PL1, a high order interpretive language with excellent string processing facilities, which would make the transition to newer computing equipment much easier and also facilitate the building in of new routines written in PL1 that may prove necessary to handle analysis at the syntactic and semantic levels.

We expect to continue to gather protocols from organization B. Mr. Michel is beginning field work for a research paper which we expect to result in the development of protocols from a third organization (C). Whether this will result in a research liaison that will lead to a series of protocols and an ongoing research relationship is not known. We continue to desire a sample of tape recorded oral communication, probably involving the services of a court reporter or the use of video tapes. This protocol will be developed, whenever feasible, as one of the budgeted "special services."

In system development, our immediate next objective is to complete, in operational form a full system of measurement, however primitive this first attempt may have to be. In particular we will limit ourselves to a set of routines that are specific to the text of the short protocol A. The result will be a progression of steps from the protocol itself to the fully coded goal structure implicit in that text. Many of the dictionary entries and other

routines developed in this activity will, of course, be trivial and not applicable directly to any other text. Nevertheless, this activity should provide a test of the applicability and completeness of the available programming facilities and generate design ideas which will carry over to the next stage of system design.

The next stage will be to prepare as much of the complete system as possible for application to protocol B and perhaps to C. A key part of this development will be a combination dictionary-thesaurus specific to the particular organization. The test of these routines will be their generalizability to different protocols from the same organization. This level of generalization is sufficient for applications or for testing of hypotheses derived from organization theory. Most studies of natural language processing that we have encountered attempt a still higher level of generality: A routine generalizable to any English language text. Such a level of generality would be useful to test linguistic and semantic theory. However, it is precisely at this level (e.g. machine translation) that even very heavy investment in research has not produced the expected payoff. One fundamental premise of our research is that, by retreating from this level of generality and concentrating on the limited and highly rationalized subculture of a single formal organization, we can succeed in a limited problem much as the General Inquirer has succeeded in attacking limited problems of content analysis.

Student participation in this research has been maintained and will be continued. The half time work of Bruce A. Michel since September, 1968, has led to substantial learning in the area of non-numerical processing. He is now ready to undertake independent research on the development of a management information system in a local company using the concepts of goal structure that we have been developing. Another research assistant, J. Carlos Schidlowski, and a seminar student, Kenneth W. Howard, have been involved in the substantive

side of the research on organization B. The linking of their research and my own with the goal structure measurements will be one of the validating tests of the developed system. This integration into the system development project is beginning this summer with the appointment of both students to part-time work on the project.

We believe that the strategy of planning the project as an activity of low intensity and long time horizon has proved wise. The serious delays in acquiring and testing software did not result in any appreciable waste of budgeted resources.

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